CROP TALK

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2008 Soybean Yields

by Horst Bohner, Soybean Specialist, OMAFRA

Soybean yields ranged from disappointing to absolutely incredible in 2008. Some producers experienced the best crop they have ever grown, while others harvested below average yields. It's too early to know what the final numbers will be for 2008, but in areas north of London yields have generally been very good. Yields of over 60 bu/ac are not uncommon in some counties. That being said, areas in the extreme south-west have again been hit by below average yields. What made the difference? The quick answer is "rainfall".

The number one yield-limiting factor for soybeans is generally lack of moisture during key growing stages. Although this spring and summer lacked in heat and sunshine, more than adequate rainfall was experienced in much of the province. Coupled with the excellent fall weather and low aphid numbers, the result was excellent yields for those that received rain in July and August. A late developing cluster of pods at the top of the plant helped push yields over the top. (Refer to Figure 1.) Those areas that had disappointing yields were generally dry in late-July and August, or suffered from diseases like white mould or SCN pressure.

What About Tillage?

No-till production sometimes gets blamed for disappointing yields. The only way to know what yield response there is from tillage systems in any given year is to have side-by-side comparisons. Some producers have experimented with spring time one-pass tillage (pre-tillage) for soybeans. In 7 Ontario 2008 replicated field scale trials, pre-tillage with the Salford RTS coulter unit averaged a yield gain of 2.3

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Figure 1 - Late Developing Cluster of Pods at Top of Plant

bu/ac. This is in line with previous results, which averaged a 1.8 bu/ac response over a three year period. Although tillage does add a small amount to yield, the response is generally 1 – 2 bu/ac. This year does not seem to be an exception.

Moisture Stress

Dry conditions can reduce yield at any stage of development, but there are two stages that are the most susceptible. Sufficient water during germination and during the reproductive growth stages is critical. Dry soil conditions during germination will reduce plant stands. Moisture stress during the reproductive stages will lead to fewer, smaller, and poorer quality seeds. Severe moisture stress is evident by leaf wilting, and under extreme conditions may lead to plant death. However, moderate moisture stress is not seen on the plant during the growing season. A lack of moisture during the vegetative growth stages (May and June) is usually not damaging if enough moisture was present for emergence.

The soybean crop is the most susceptible during the reproductive stages of growth. Once the plant starts to flower, it needs significant water right through to seed-fill. This means that both July and especially August are critical to yield. This year was a good example of how enough moisture during those two months can push yields above 60 bu/ac.

Soybean yield is a function of the number of plants/ acre, pods/plant, seeds/pod, and the size of the seed. Each of these yield components is fixed in the above order. Moisture stress confined to a specific growth stage reduces the yield component that is established during that phase. On the other hand, water abundance during a specific phase enhances a specific component. Early stress, during the reproductive stages, reduces seed number. However, if moisture returns that reduction is offset by enhanced individual seed size or mass. Later stress, during the reproductive phases, greatly depresses seed mass, the last yield component to be fixed during reproduction. Refer to Table 1, Yield, Number & Individual Mass Response To Moisture Stress.

Table #1 - Yield, Number, and Individual Mass Response to Moisture Stress

Water Stress Timing	Yield (g pot $^{-1}$)	Seed Number (no. pot $^{-1}$)	Individual Seed Mass (mg seed $^{-1}$)
Control	29.3 a	240 a	120 b
R1-R5	24.1 b	129 c	190 a
R5-R7	16.9 c	196 b	90 c

Means followed by different letters are significantly different, LSD (P = 0.05). Reaper and Purcell, 1999.

Soybean varieties grown in Ontario have an indeterminate growth habit. This results in an extended flowering period, lasting from the end of June into early August. Yield that may be lost due to flower abortion early in the reproductive stages can be compensated for by flowers and pods that will be produced later in the season. If plants go through the entire flowering period with insufficient moisture, significant yield losses will occur. Even if water is supplied after flowering, yield losses cannot be regained.

Strategies for Success

Since irrigation is not economical, there are no management strategies to alleviate moisture stress once it occurs. The following practices have been shown to reduce the impact of moisture stress:

1. Planting deep enough for adequate germination moisture.
2. Early planting for greater root depth and density.
3. Establishing a full canopy early in the season through narrow rows.
4. Excellent weed control to reduce competition.
5. Good crop rotation and fertility program.
6. Careful management of disease and insects.
7. Choosing a number of varieties with different maturities to spread the risk of when the dry period will impact a specific variety.

'Aromatic Gold' – How to Take a Sample to Determine Value of Manure

by Christine Brown, Nutrient Management Lead, OMAFRA

One of the least sought-after tasks on the farm, manure sampling, is also one of the most profitable!

Manure supplies nutrients for crop growth, organic matter for soil conditioning, and decreases the need to purchase off-farm nutrients. Manure analysis will give a tangible depiction of the amount of nutrients available.

The nutrient content of each type of manure will vary, depending on livestock genetics, feed ingredients, type of bedding, and the amount of washwater or other liquids. These factors affect the amount of N, P and K in the manure.

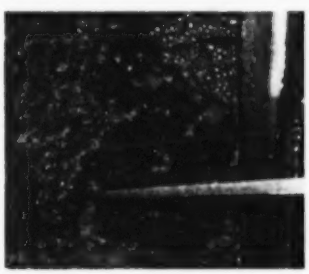
Samples, especially of liquid manure being applied to a corn crop, can be separated by storage or by field. The nutrient concentration can vary from top to bottom, depending upon the uniformity of agitation. Phosphorus is generally higher in the solids portion of manure, while potassium is generally higher in the liquid portion. Ammonium-nitrogen is highest in the liquid portion.

A manure storage should be sampled each time the storage is emptied for several years, until the results are consistent. This will also help create a database of the nutrient content generated in your farm operation.

Analysis should include total nitrogen, ammonium-nitrogen, phosphorus, potassium and dry matter content. Copper and zinc analysis are also useful for operations supplementing these micronutrients in the ration.

How to Sample Liquid Manure

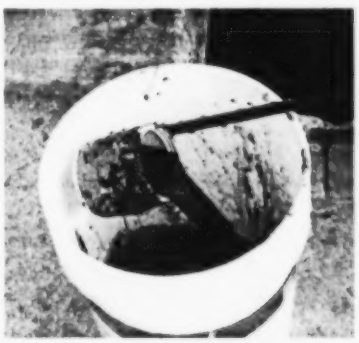
1. Agitate manure storage thoroughly



2. Collect random sub-samples of manure from various depths in the storage.

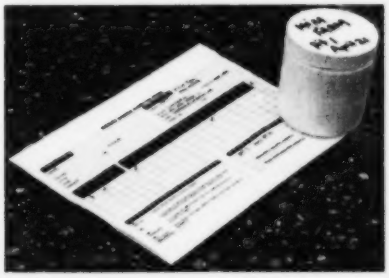
3. The sampling should take place while the storage is being emptied (i.e. every 10 loads or every 30–60 minutes from a drag hose pump).

4. Use a clean plastic pail to collect samples.



5. Mix 10-20 sub-samples thoroughly in a larger pail and transfer a small sample to a plastic jar (supplied by laboratory). Fill jar only half full to allow room for gas buildup. Store in a cool place until sending the sample to the lab.

6. Consider taking another sample when applying to a different field to document the analysis for each field.



7. When results from the manure analysis are received, keep records and adjust any additional nutrient applications to the field.

Solid manure is more difficult to sample because there is no agitation process, resulting in variations within solid storages. For this reason it is recommended that samples be separated by field rather than storage.

How to Sample Solid Manure

1. Samples of solid manure can be taken from the spreaders during application or from the top, middle and bottom of the storage.
2. On clean concrete or a plywood surface, take sub-samples (a forkful) of manure from several different loads throughout the application or from the different areas of storage.
3. Chop and mix the sub-samples together using a fork or shovel.
4. Divide the larger sample into four equal parts and discard three.
5. Continue to mix and subdivide until you have a sample that will fit into a plastic bag or sample jar.
6. Place sample jar into a plastic bag and ship to lab as per liquid sample.
7. Repeat sampling procedure if a portion of the manure will be applied to a different field or if the dry matter content is significantly different (dry vs "soupy").
8. Each storage system (or areas within the same storage with different dry matter contents) should have its own sample taken to reflect dry matter and specific nutrient content.

Manure samples should be stored in a cool place until they are shipped to a laboratory. Shipping a sample so that it arrives at the laboratory on a week day is recommended to ensure immediate processing. Sending samples through the post office is not recommended.

Fertilizer, Fall or Spring?

by Keith Reid, Soil Fertility Specialist, OMAFRA

Applying fertilizer as close to the time the crop needs it generally provides the greatest benefit. The longer the fertilizer sits in the soil, the greater the chance it will either be lost to the environment or get tied up in less available forms. There are exceptions, however, where the advantages of fall application out-weigh the risks.

Time Availability

Time availability is one of the chief advantages of fall application. There is never enough time in the spring. Applying the fertilizer in the fall could mean getting the crop in two or three days earlier. Application equipment is also more available in the fall. However, you should check the equipment over carefully when you get it. Most blenders do equipment overhauls during the winter, so during the fall the spreader will have had a full season of hard use since the last thorough going-over.

Price & Tax Implications

Fertilizer price savings from fall application are much more difficult to predict, particularly this year. Last fall, the market signals all pointed to significant price increases over winter. This year, the signals are much less clear. In any case, you can manage the tax implications by pre-paying fertilizer for spring application, rather than taking delivery now.

Potassium

Potassium can benefit from fall application on light textured soils which are no-tilled, by allowing winter precipitation to move the potassium down into the root zone. Where very high rates of K are being applied on sandy soils, as might be the case for processing tomatoes, fall application can reduce the risk of salt injury to the crop by allowing the chloride to leach over winter. In heavy clay soils,

there can be some tie-up of potassium between the clay layers, and fall application allows more time for this process to occur.

Phosphorus
Phosphorus immediately begins to react with minerals in the soil to form less soluble compounds. On a high testing soil where you are applying nutrients to maintain soil test rather than for immediate crop response, this is not a problem because the tie-up is balanced by the release of previously applied phosphorus. However, on very low testing soils and if the fertilizer is broadcast, by the time crop growth begins next spring most of the fertilizer you applied could be tied up in unavailable forms. Banding to reduce the contact with the soil would help to reduce the rate of tie-up. However, if you are going to the trouble of banding P, it may as well be applied as a starter.

Of course, there will be some loss of both phosphorus and potassium if soil is eroded off the field.

Nitrogen
The one nutrient where the risks of fall application clearly outweigh the benefits is nitrogen. With Ontario conditions, there is too much risk of N loss over winter for this practice to be economically or environmentally acceptable.

There is no single correct answer as to whether you should apply fertilizer this fall. You will have to balance your own factors in making the final decision.

Is That Fertilizer a Good Deal?

by Keith Reid, Soil Fertility Specialist, OMAFRA

It looks like we are heading into a year of volatility in the fertilizer markets, which will mean growers are looking for pricing opportunities. It is easy to do price comparisons when you are comparing the same product from different suppliers, but comparing two different products is not as straightforward.

Convert To Price Per Unit of Nutrient
The solution is to convert the price per tonne (or per litre) into a price per unit of nutrient.

The math is pretty simple with a hand calculator as long as you know the price per unit weight of the material, and the fertilizer grade. For example, you know that the local price for urea is $920/tonne, and you find a supply of ammonium sulphate (21-0-0) for $500/tonne. The price per tonne is attractive, but should you buy?

$$\frac{\text{Price per tonne of material}}{\text{Fertilizer grade X 10}} = \text{Nutrient Cost (\$/kg of nutrient)}$$

By this calculation, the nitrogen from urea will cost ($920/460) = $2.00/kg. Using the same calculation, the ammonium sulphate will cost $2.38/kg, so urea is still a better buy. If you are more comfortable dealing with imperial units, simply divide the prices per kilogram by 2.2 to get the price per pound.

Liquid Fertilizers
Liquid fertilizers, particularly starters, are a bit more complicated, since they are often priced by volume so the specific gravity (density) of the material needs to be considered. To determine the price per kilogram of nutrient in a liquid, divide the price per litre by the liquid density multiplied by the percent nutrient in the material.

$$\frac{\text{Price per litre of material}}{\text{Density (kg/l) X Fertilizer Grade/100}} = \text{Nutrient Cost (\$/kg of nutrient)}$$

A 6-24-6 liquid fertilizer is priced at, for example, $1.50/litre. Density of liquid fertilizers can be found in OMAFRA Publication 811, *Agronomy Guide*, or at www.omafra.gov.on.ca/english/crops/pub811/2fertmat.htm#table228. The density of this fertilizer is 1.329 kg/litre, so the price of the phosphate in this fertilizer is $4.70/kg. Using the calculations above for granular fertilizer, the phosphate from MAP at $1500/tonne is 2.88/kg. The MAP is obviously the more economical nutrient source in this example.

It is a good idea to run through these calculations when approached by someone making you an offer you cannot refuse. Some simple math can reveal that in the end you are not getting that good of a deal for what you are buying.

(modified from an article by David Henry and Robert Mullen that originally appeared in the C.O.R.N. Newsletter)

Fall Weed Management Wrap-Up

by Helmut Spieser, Engineer - Pesticide Application & Grain Storage, OMAFRA & Gilles Quesnel, Field Crop Integrated Pest Management Specialist, OMAFRA

With harvest winding down, what else needs to be done around the farm? Probably lots, but before the temperatures drop too low, field sprayers should be winterized and next year's no-till fields should be scouted for over-wintering weeds.

Cleaning and winterizing your sprayer will protect it from frost damage and have it field-ready for next spring. Clean the sprayer, both inside and outside, to get rid of accumulated dirt and grime. More importantly, clean to remove as much of the chemical residue from the system as possible. Do not wash the sprayer near lawns or sensitive areas. To protect all plumbing components at risk of damage by water freezing, use a 50/50 mixture of good quality antifreeze and water. Most manufacturers recommend the use of automotive antifreeze over the use of RV antifreeze. This antifreeze mixture in the plumbing system will also prevent oxidation from occurring, by not allowing air to contact metal surfaces causing rust, and also not damage seals and o-rings.

Cleaning and Winterizing Steps:

- Use a pressure washer and detergent to thoroughly wash the outside of the whole sprayer.
- Clean the inside of the spray tank completely, using a good tank cleaner.
- Circulate this cleaning solution for ten minutes through the agitators, the chemical inductor and the tank wash nozzle(s), if the sprayer is so equipped.
- Remove and thoroughly clean out the end plugs or end caps on all boom sections. Rinse with sufficient cleaning solution to remove all product residues.
- Remove all filters, screens, nozzles and diaphragm check valves and wash them in the same cleaning solution. A nozzle tip brush will aid in removing any build-up of material on screens.
- Reinstall all the filters, screens, nozzles and diaphragm check valves.
- Mix 23 litres (5 gal) of antifreeze and water (plumbing volume may be as high as 112 litres or 25 gallons for large sprayers). Pump it through all circuits of your sprayer, especially the agitator circuit. After 10 minutes of circulation through the various plumbing circuits, spray the mixture out through the boom and nozzles.
- Replace the boom end caps or plugs.
- Completely drain the foam marker tank and the solution lines that go out to the boom ends. Use compressed air to blow out any remaining liquid in the foam marker lines.
- Store your sprayer in a clean dry building.

Scout Weeds

With the field sprayer away for the winter, turn your attention to fields which will be no-till planted next year. Check these fields for the presence of overwintering weeds. With a quick scouting this fall, you can identify existing winter annual weeds, such as chickweed; biennials, such as wild carrot; and stubborn perennial weeds, such as dandelions. To effectively determine the extent of overwintering weed pressure, individual fields will need to be scouted and weed species density recorded.

Recording and/or mapping over-wintering weed species in late fall, including density and location will help you evaluate your weed management from one year to the next. The information will also help you plan next year's weed control program, providing you with a heads-up on the need and type of pre-plant burndown applications.

Canola BMP Trial – Raising the Yield Bar

by Brian Hall, Canola & Edible Beans Specialist, OMAFRA

Sharp increases in production costs have farmers looking for ways to squeeze every bushel they can out of their crops. To pave the way to higher canola yields, the Grey Soil & Crop Improvement Association in conjunction with the Ontario Canola Growers launched a canola Best Management trial in 2008. Foliar fungicide was tested alone and also in combination with boron and insecticide.

Fungicide, Boron & Insecticide Applications?

Boron is of interest to canola growers because canola requires more boron than other field crops. The University of Guelph reported a significant response to boron in 2007 trials. Insecticide application at flowering has improved yields in years when high populations of seedpod weevil and/or tarnished plant bugs have occurred. Plots were monitored for growth, nutrient deficiencies,

2008 Canola Best Management Trial, Grey SCIA & Ontario Canola Growers

Location	Yield lb/acre			
	Check (no treatment)	Proline	Proline + Boron	Proline + Boron + Matador
Alliston	1870	1765	1752	1940
New Liskeard	2264	2251	2196	2164
Owen Sound	3221	3445	3555	3470
Grand Valley	2718	2708	2649	2718
Sturgeon Falls	2842	2791	3048	2993
Palmerston	2549	2609	2684	2671
Durham	2360	2339	2412	2388
Meaford	3036	2989	3253	3166
Chatsworth	3158	3410	3535	3343
Average Yield lb/ac	**2583**	**2592**	**2640**	**2657**
Yield Increase vs check (lbs/ac)		9	57	74
$/ac Return over Check		-31	-22	-21

1.0 lb/ac = 1.136 kg/ha

and pests. Soil and tissue samples were collected and results are being analyzed.

The average yield achieved by co-operators was an incredible 2,583 lb/acre (2,935 kg/ha), with several co-operators breaking yields of 3500 lbs/acre (3,977 kg/ha)! Canola yields improved only slightly with increasing inputs.

No Economic Benefit

None of the treatments increased $ returns over the check treatment (no foliar application). Sclerotinia (white mould) was present in all plots at moderate levels. Visual differences were evident between the check (no foliar application) versus those that received a fungicide application. Surprisingly though, fungicide treatment only improved returns at 2 (Owen Sound, Chatsworth) out of 9 sites. It is not clear why the fungicide did not improve yields more, given that there was significant sclerotinia pressure. One reason may be that sclerotia levels in the soil were very low following several years of low pressure and the disease did not gain a foothold until later in the season.

No Significant Yield Improvements

The addition of boron or insecticide did not significantly improve yields. Populations of seedpod weevil and plant bug were low in 2008. This highlights the value of a scouting program and using thresholds to make decisions on product application.

Canola growers definitely had weather on their side this year, with moderate temperatures and adequate (or too much) rainfall combining to produce record canola yields. Overall, results of the trial showed little benefit to any of the treatments this season, but what about next year?

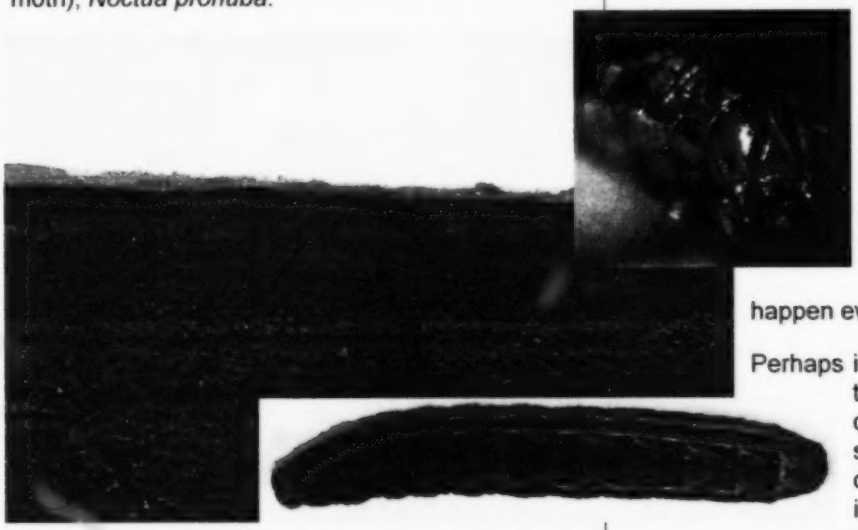
Will Winter Cutworm Show Up This Year?

by Tracey Baute, Field Crop Entomologist, OMAFRA-Ridgetown

This time last year several reports were coming in from northern Michigan regarding a caterpillar that was acting strangely similar to armyworm. Caterpillars were taking out lawns, hay and winter wheat fields, but unlike armyworm, this was taking place in the fall.

Homeowners and County Extension Agents were calling in to Dr. Chris DiFonzo complaining of significant bare patches in their lawns and fields with numerous winter cutworm larvae littering the ground. The feeding continued into December and

on warmer days throughout the winter. By early spring, more reports of damage came from Michigan and even an incidence here in Parkhill, Ontario. The culprit in question was winter cutworm (also known as greater yellow underwing moth), *Noctua pronuba*.



Damage from winter cutworm in small grains fields field in northern Michigan in fall 2007. Photos courtesy of Dr. Chris DiFonzo, MSU

Description

Winter cutworms are a common caterpillar that feed on many types of plants. Moths are active during the summer and are a mottled brown in colour with dark orange underwings. They lay their eggs in late summer, which hatch into larvae in early fall. The larvae are light- to dark-brown in colour, with black symmetrical dashes that make the larvae appear to have a conveyor belt on their back. Their orangey-brown heads have two dark-brown chevrons pointing towards each other on the "face".

Very Cold Tolerant

The real concern with this critter is that the larvae are very cold tolerant. They survive sub-freezing temperatures, and will feed throughout the fall and under the snow cover during warmer winter days. So when spring arrives, crops that were there before the winter may not be there after the snow melts. It's similar to having armyworm during the fall and winter months. Foliar insecticides are not an easy solution. Insecticides do not work well in colder temperatures so infestations need to be managed in early to late fall, before the mercury drops. In the spring, the insect is in the pupae stage, which is too late to spray. At that time, the only option left is to do a replant.

This Winter?

Will this happen again this year? We are not sure what to expect because we don't know why they moved into field crops last year,. Our black-light trap running here in Ridgetown did capture a large flight (more than 900 moths) of winter cutworm moths in July. However, there is no historical data to know if that is enough to be a concern. We were not looking for it before. The situation could happen every year.

Perhaps it was too wet this summer for their eggs and larvae to develop properly. Wet seasons usually help fungal diseases develop that kill insects off. This fall is not as warm as last fall, so this critter might not be as active this year. One report has already come in from Michigan this week, but there were several by this time last year. We just want to make sure that growers and reps are monitoring for it, so that it doesn't get ahead of us this time.

Scout Before Snow Cover

Hay and winter wheat fields should be accessed at least once before there is substantial snow cover. Look for bare patches in fields and larvae that may be present or moving in from neighbouring fields and ditches. Don't confuse winter cutworm with grub damage. Grubs feed underground. Once you get out of the vehicle and look at the actual plants, you should see feeding on the leaves and stems, not feeding of the plant roots.

No thresholds are available. However, Michigan was finding some success when spraying populations of 4 or more larvae per square foot, as long as temperatures were warm enough. It will probably be too late to spray if we do reach damaging levels, unless we have a batch of warmer days before winter. Knowing whether they are present can help prioritize infested fields to be checked again immediately after snow melt in order to determine if replanting is necessary. If winter turns out to be very cold with little snow cover, that could also lessen the damage.

Bio-Energy Crops Research

by Ian McDonald, Applied Research Coordinator & Scott Banks, Alternate Crops Specialist, OMAFRA

Various crops are being looked at around the world as a source of "green" energy. In North America, the most immediate use of these crops is for burning to heat greenhouses and homes. Research continues to search for a significant breakthrough in developing cost effective technologies to convert biomass crops into ethanol through cellulose ethanol production.

The main bio-energy crop species being looked at are switchgrass and miscanthus (x giganteus). Both these grass species are warm season grasses. Switchgrass has a very small seed and is slow to establish. Miscanthus is a sterile hybrid, so it must be propagated by planting underground stems, called rhizomes. Establishing a stand with rhizomes is relatively expensive compared to planting seed. Once established, both switchgrass and miscanthus are productive for more than 10 years.

We recently had the opportunity to tour a couple of research stations in the United States that are researching different bio-energy crops.

Michigan State University
Michigan State University researchers are looking at establishment of switchgrass with and without a companion oat crop. The objective is to look at the potential of having an oat forage crop to harvest in the establishment year when there is normally very little switchgrass yield to harvest. The switchgrass establishment success will be compared to direct seeded plots to determine the impact of the companion oat crop on switchgrass establishment.

Another researcher is comparing a one- versus two-harvest switchgrass system per year to evaluate the total biomass yield potential and quality for burning or cellulose ethanol production.

A third research project is researching the yield response to various nitrogen rates under both switchgrass harvest systems to determine the most economical nitrogen rate.

University of Illinois
Illinois State University is researching planting, harvest, storage, transport, conversion to biofuels and carbon sequestration of bio-energy crops. Illinois field trials in 2005 and 2006 by Dr Frank Dohleman has shown switchgrass dry matter yields of about 5 tons/acre (11.3 tonnes/ha) and miscanthus yields of 14 tons/acre (31.7 tonnes/ha). Their current research is now focusing on miscanthus because of its greater yield potential.

Miscanthus is a sterile hybrid, so it must be propagated by planting underground stems, called rhizomes. The harvesting of rhizomes from existing miscanthus stands and the planting of new stands is a very labourious process. Research into mechanization of harvesting and planting of the rhizomes to reduce the time and labour to establish this crop. In Europe, where Miscanthus has been grown for more than a decade, patented farm equipment can plant about 50 acres of Miscanthus rhizomes a day.

In Ontario
Currently there is on-going bio-energy crop research at several stations across Ontario. Research programs are looking at potential bio-energy crops species, such as miscanthus, switchgrass, big blue stem, prairie cord grass, common reed (phragmites), hybrid corn and hybrid sorghum. There are breeding programs to develop higher yielding varieties. Agronomic research is looking at establishment, weed control, fertility, harvest timing (fall versus spring) and handling systems.

There are about 600 to 700 acres in of switchgrass in Ontario currently in production. Some of this production is already being used for heating. There is a small company starting up in eastern Ontario that is looking to contract with farmers to grow switchgrass for greenhouse heating.

In the short term, most of the bio-energy crops will be utilized by burning to produce heat for greenhouse operations and home heating, to offset natural gas and other fuels. Long term, bio-energy crops may be used in a cellulose conversion process to produce ethanol, as cost effective conversion methods are developed.

Is Biomass Heat a Future Enterprise for Your Farm?

by Ian McDonald, Applied Research Coordinator, Field Crops, OMAFRA

The Show Me Energy Co-operative (www.goshowmeenergy.com) in Centerview, Missouri, was toured in early October by Scott Banks and Ian McDonald, OMAFRA, along with Dr. Bill Deen and Ken Janovicek, from the University of Guelph. What the Show Me Energy Co-operative is accomplishing is a bright example of how farmers and rural communities can seize opportunities to benefit from the emerging bioeconomy.

Biomass Pelletization Plant
At the Co-operative, 400 producers have each invested a minimum of $2,500 to build a biomass pelletization plant. Approximately $8 million was capitalized to build the plant with the capacity to process 150,000 tons per year of biomass into pellets. The plant was started in May 2007 and shipped its first pellets in July 2008. Members are on track to recoup their investment by the end of the second year.

Two qualities of pellets are produced at the plant. The pellets for the home owner market are bagged in 40 lb (18 kg) plastic bags. A more industrial pellet product is shipped in bulk or in large totes. Customers include home owners and small businesses who have installed pellet stoves, furnaces or boilers alone or in tandem with their current heating system, to reduce their heating costs. Larger customers include a University that has installed large biomass burners for their campus heating system. An electrical utility is also purchasing pellets to co-fire with coal to produce electricity.

The Show Me Co-op has some very forward thinking and shrewd people on their Board. They are planning to develop a company that can sell the concept as a turn-key operation to other farmer groups throughout North America.

Feedstocks
The Co-op only accepts biomass from its members. Members can deliver any biomass source, but are obligated to tell the plant what the biomass is and deliver it to the plant as required. Any biomass shortfalls are made up by out-sourcing. Typical feedstock includes poor quality round bale hay, grain, soybean straw, corn stover, and seed cleanings. The members are getting $70 per ton plus delivery. The most interesting off-farm source of biomass received was ground up currency from the US Federal Reserve. The members are all located within 80 miles of the plant, but a much closer radius of biomass supply would support the plant.

Processing
The biochemistry of the feedstocks has been studied to enable recipes to be made from the different feedstocks available that will produce the pellet quality they are targeting. Three large coverall sheds are filled with different types of biomass. Each has a large hopper at the end that is kept full by a front end loader. The hay is processed through a grinder and blower system. The control room can meter the volumes of various feedstock sources to the mixer. This ensures that the right volumes of the various materials come together to give the consistency of feedstock into the pelletizers in order to form the best pellets possible. Two big Swedish pelletizers, each driven by two 200 hp electric motors, extrude the pellets.

Sustainability
Another very positive aspect of the Co-op is their philosophy on sustainability. They believe the health of the land is critical to the long term sustainability of their enterprise. They are working with the University of Missouri to determine the level of residue removal from the fields that is sustainable. Considerations include feedstock type, soil type, and topography. The members are required to sign a contract ensuring a specified level of residue cover on their fields is maintained. Checks are made by the Co-op to ensure members are adhering to their commitment.

Opportunities
Heating requirements for buildings and hot water across Ontario are huge. Solid fuels could be used to meet these heating needs by creating farm and farmer Co-op based enterprises within local and regional communities. Some Ontario farmers are already looking at these types of markets to broaden their farm enterprises. With the high level of need in rural communities alone, there is a great opportunity to expand the pelleted biomass fuel concept across Ontario.